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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,365	12/12/2003	Chaur-Chin Yang	BHT-3183-63	8705

7590 07/29/2005

BRUCE H. TROXELL
SUITE 1404
5205 LEESBURG PIKE
FALLS CHURCH, VA 22041

EXAMINER

PAREKH, NITIN

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 07/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/733,365	YANG ET AL.	
	Examiner	Art Unit	
	Nitin Parekh	2811	

AK

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 2 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 2 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US Pat. 5903052) in view of Paniccia (US Pat. 5895972).

Regarding claims 1 and 2, Chen et al. disclose a BGA type/conventional thin-type BGA semiconductor package (see 10 in Fig. 1) comprising:

- a composite multilayered substrate (CMLS)/printed wiring board substrate (PWBS) including a MLS/PWB (see 24/12a/12b in Fig. 1) and a heat spreader/heat slug (HS-16 in Fig. 1),
- the MLS/PWB having an upper surface, a lower surface and an opening (see 26/12e in Fig. 1), the opening passes through the upper surface and the lower surface, a step is formed in the opening (see Fig. 1)
- the HS has a first/top surface and a second/bottom surface where the first surface is attached to the lower surface of the MLS/PWB
- a plurality of ball pads (36/34 in Fig. 1) are formed on the lower surface, a plurality of bonding sites/connecting pads are formed on the step (not numerically

referenced in Fig. 1; see bonding wire connections on the surface 12a in Fig. 1; Col. 4, lines 14-20) and electrically connect with the ball pads

- the HS being attached to the lower surface of the MLS/PWB and covers the opening to form a chip cavity
- an integrated circuit (IC) chip (14 in Fig. 1) disposed in the chip cavity, the chip having an active/upper surface and a back/lower surface
- a plurality of bonding pads being formed on the active surface and electrically connected to the connecting pads of the wiring board (see Fig. 1), the back surface of the chip being attached to the HS
- a package body comprising an encapsulate/dispensing material/sealant (30 in Fig. 1) being formed in the chip cavity of the composite substrate sealing the IC chip and bonding wires (see 30, 14 and 20 respectively in Fig. 1)
- a plurality of solder bumps/balls (22 in Fig. 1) on the ball pads
- the HS having a thickness being smaller than the height/diameter of the solder bumps/balls (see Fig. 1 and 5), and
- the HS having an exposed lower surface opposing the surface being attached to the MLS/PWB, a solder/metal (see 44 at the lower surface of 16 in the final structure of Fig. 5; Col. 4, lines 30-46) film being formed on the exposed surface

(Fig. 1-5; Col. 2, line 45- Col. 4, line 46)

Chen et al. disclose the HS being attached to the back/lower surfaces of the chip and the MLS/PWB wherein the HS has the metal film over the second surface, but fail to teach a dummy die being attached to the lower surfaces.

Paniccia teaches a thermally dissipative wire bonded package having a heat slug (HS) being attached to a back surface of a device/chip (see 820 and 802 respectively in Fig. 9A) wherein the HS comprises a dummy substrate without any electrical connections therein, such dummy silicon die substrate (820 in Fig. 9A) providing the desired thermal performance for the device application requirement (Col. 8, lines 1-20; Col. 5, lines 57-63).

It would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the dummy die having the metal film on the second surface being attached to the lower surfaces of the chip and the wiring board as taught by Paniccia so that the desired thermal dissipation can be achieved in Chen et al's BGA.

Response to Arguments

3. Applicant's arguments filed on 05-25-05 have been fully considered but they are not persuasive.

A. Applicant contends that Paniccia does not teach the composite substrate and the dummy die having the metal film.

However, the primary reference of Chen et al. discloses the BGA structure comprising the CMLS and the HS having the metal film. Paniccia is combined with Chen et al. to provide the dummy die under the chip to improve the heat dissipation.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number is 571-272-1663. The examiner can normally be reached on 09:00AM-05:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Steven Loke can be reached on 571-272-1657. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAN or Public PAG. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAG system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

NP

07-27-05



NITIN PAREKH

PRIMARY EXAMINER

TECHNOLOGY CENTER 2800